Commentary

Community-Acquired Pneumonia
Is It Time for the Penicillin Bullet to Be Replaced?

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A common diagnostic and therapeutic problem in medicine is that of community-acquired pneumonia. Penicillin has often been touted as the drug of choice because *Streptococcus pneumoniae* has been considered to be the major cause of community-acquired pneumonia. This concept is intrinsically unsound because communities vary greatly, as do causes of the pneumonia acquired in these communities. Pandemics due to influenza or to other microbes that have been recognized in the past ten years also shift the etiologic profile greatly. Amid these complexities, physicians operate under increasing pressure by managed health systems to provide economical care.

The diagnosis and treatment of pneumonia now require a complicated set of decisions, some of them tainted by litigious pressures. With the current constraints on time and resource use, physicians need to diagnose the cause of community-acquired pneumonia with a minimal number of laboratory studies and to decide if the use of a particular antibiotic for therapy is warranted. Under a system of capitation, physicians must be particularly conservative in the types of laboratory studies and consultants that they use in managing this disorder. Many antibiotics cover most of the major causes of community-acquired pneumonia. It is, therefore, more expeditious to use them de novo rather than to wait for diagnostic studies, including the time-honored sputum Gram's stain and cultures. As the Finnish architect Mies van der Rohe (noted for his architecture characterized by simplicity) said many years ago, "Less is more." To extend this philosophy even further to the economic issues of the 1990s, "Do less and get more." Frequently, in the evaluation of a case of possible community-acquired pneumonia, a chest roentgenogram is obtained. More diagnostic tests may be used if the patient is immunocompromised, does not respond to an antibiotic, or has serious associated illnesses.

Unfortunately, community-acquired pneumonia may now be caused by several newly recognized agents that do not respond well to penicillin therapy. Pathogenic agents such as *Haemophilus influenzae* and *Moraxella catarrhalis* may produce penicillinase that inactivates penicillin. In some communities, 30% to 40% of cases of infection due to *H influenzae* are resistant to penicillin and ampicillin; for infections due to *M catarrhalis*, the prevalence of resistance may be 95% or more. Other agents resistant to penicillin can mimic bacterial pneumonia acquired in the community, for example, *Chlamydia pneumoniae* in elderly patients or *Mycoplasma pneumoniae* in young adults.[1] Therefore, more second- and third-generation cephalosporins (such as cefixime, cefuroxime, or expanded cephalosporins such as cefpodoxime proxetil and loracarbef), generic tetracycline or doxycycline, and the erythromycins (particularly the newer conjugers of clarithromycin and azithromycin) are being used to treat community-acquired pneumonia.

The American Thoracic Society now recommends a "machine-gun" approach to the treatment of pneumonia with a limited use of laboratory tests because of the uncertainties in origin.[2] Stress is given to determining the cause based on the history and physical examination (how Oslerian!). Until a patient's laboratory data indicate a clear cause, treatment is commonly initiated with either a tetracycline (doxycycline), erythromycin (modern alternatives, azithromycin and clarithromycin), or even a quinolone (ofloxacin or ciprofloxacin) in non-immunologically compromised patients. When a patient is immunologically compromised, a cephalosporin is added to one of these three classes of antibiotics. The use of these newer agents is convenient because they are taken once or twice a day for mild to moderate cases of pneumonia. Bacteremia does sometimes occur while pneumonia is being treated with some of these newer antibiotics, but breakthrough bacteremia occasionally occurred even in the early days of the treatment of pneumococcal pneumonia with penicillin.

A decision to use penicillin as a first-line antibiotic for community-acquired pneumonia is further eroded by the emergence of both relative and major resistance to this antibiotic by *S pneumoniae*. Alternative antibiotics in this setting include ceftriaxone sodium and vancomycin. In fact, in some parts of the southern United States, a relative resistance of *S pneumoniae* to penicillin

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is found in greater than 50% of patients.[3] This resistance is an increasingly strong argument for immunizing whole segments of our population with a pneumococcal vaccine. The currently available vaccine for *S pneumoniae* incorporates serogroups that include some 80% to 85% of organisms that are found to be the cause of pneumonia in this country. Other nations compound vaccines differently. Unfortunately, serogroup 6A, a common cause now of penicillin resistance, has not been incorporated in current vaccines, but new vaccines are being reformulated.

For community-acquired pneumonia, penicillin can no longer be considered a highly effective first line of defense to be blindly administered for an unknown microbial target.

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